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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/732,777	12/10/2003	Gottfried Rainer Dohle	78323CIP1 (P1261G US CIP)	6984
27975	7590	03/22/2005	EXAMINER	
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST P.A. 1401 CITRUS CENTER 255 SOUTH ORANGE AVENUE P.O. BOX 3791 ORLANDO, FL 32802-3791			LEE, EUGENE	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/732,777

Applicant(s)

DOHLE ET AL.

Examiner

Eugene Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 December 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 12/10/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: element 50, 52. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to because it is not clear what the element 51 in FIG. 5 is representing since element 51 in Fig. 3 is already representing a component of a first material. The specification does not disclose what element 51 in FIG. 5 represents. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from

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the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, (1) the P side and an N side, (2) first subcomponent, (3) second subcomponent, and (4) the layers of second material must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. Features (2), (3), and (4) appear in Fig. 3, however, they do not appear TOGETHER with Feature (1) as it is stated in claim 1. Also, claim 8 (contact structure is affixed to the N-side) is not shown in the figures.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the

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drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities: on page 4, paragraph 19, line 3, there is an unnecessary space in the word "For"; on page 8, paragraph 35, line 4, there is a "." punctuation missing.

Appropriate correction is required.

Claim Objections

5. Claim 1 is objected to because of the following informalities: it is unclear whether the limitation "the layers of the second material" in line 13 is referring to the "a layer of a second material" in line 9. Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 3, 4, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saint-Cyr 4,879,589 in view of Neumann et al. 5,614,736. Saint-Cyr discloses (see, for example, FIG. 1a, and 3) a semiconductor device comprising a diode chip (semiconductor component) 13, contact (contact structure) 21 wherein the contact comprises a strip of molybdenum (first subcomponent) 23, and copper sheets (second subcomponent) 24, 25. In column 3, lines 10-13, Saint-Cyr discloses the contact structure having a coefficient of thermal expansion sufficiently well matched to the silicon diode chips to provide stress relief in all dimensions. Saint-Cyr does not disclose a P side and an N side; and a contact structure on either the P side or the N side. However, Neumann discloses (see, for example, FIG 2) a semiconductor device comprising a p-type first epitaxial layer (P side) 2' and an n-conductive layer (N side) 1', and a contact structure 6', 7', 8' on the n-conductive layer. The p-type first epitaxial layer and n-conductive layer provide a PN-junction to form a diode. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have a P side and an N side; and a contact structure on either the P side or the N side in order to form a PN-junction for a diode.

Regarding claim 3, and the limitation "hard solder", see, for example, FIG. 2c wherein Saint-Cyr discloses a solder preform (hard solder) 28.

Regarding claim 4, Saint-Cyr in view of Neumann does not disclose the second subcomponent having a thickness on each opposing surface that is within a range from about one-twentieth to about one-fifth of the contact structure thickness. However, it was well within the skills of an artisan in the art to optimize the performance of a second component by adjusting the thickness in order to provide a reliable contact structure which avoids delamination, and

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whose thermal expansion properties are matched with a diode. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have the second subcomponent having a thickness on each opposing surface that is within a range from about one-twentieth to about one-fifth of the contact structure thickness because it was well within the skills of an artisan to optimize the performance of a second component by adjusting its thickness in order to provide a reliable contact structure which avoids delamination, and whose thermal expansion properties are matched with a diode. See *In re Aller*, 105 USPQ 233.

Regarding claim 8, and the limitation “the contact structure is affixed to the N-side”, see, for example, FIG 2 wherein Neumann discloses the contact structure 6', 7', 8' being affixed to the n-conductive layer (N-side) 1'.

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saint-Cyr '589 in view of Neumann et al. '736 as applied to claims 1, 3, 4, and 8 above, and further in view of Nyul 3,622,906. Saint-Cyr in view of Neumann does not disclose a plurality of semiconductor components affixed to a common substrate; and a plurality of contact structures. However, Nyul discloses (see, for example, Fig. 3) a device comprising a plurality of diodes (plurality of semiconductor components) D1-D4 affixed to a wafer (common substrate) 12, and a plurality of contact layers (contact structures) 52. The wafer brings the plurality of diodes together and dissipates heat. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have a plurality of semiconductor components affixed to a common substrate in order to bring the devices together, and dissipate heat.

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9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saint-Cyr 4,879,589 in view of Neumann et al. '736 as applied to claims 1, 3, 4, and 8 above, and further in view of Spaeth 5,812,570. Saint-Cyr in view of Neumann does not disclose the hard solder being a gold-tin solder. However, Spaeth discloses (see, for example, column 4, line 4) an adhesive made of AuSn alloy (gold-tin solder). It would have been obvious to one of ordinary skill in the art at the time of invention to have the hard solder being a gold-tin solder because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice (In re Leshin, 125 USPQ 416) in order to adhere two structures in a semiconductor device together.

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saint-Cyr 4,879,589 in view of Neumann et al. '736 as applied to claims 1, 3, 4, and 8 above, and further in view of Basol 4,666,569. Saint-Cyr in view of Neumann does not disclose the second material being silver. However, Basol discloses (see, for example, column 3, lines 52-65) a semiconductor device comprising a copper layer and an overlying second metal layer (second material). The second metal layer may comprise silver and provides a stable, intimate contact with the copper layer. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have the second material being silver because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice (In re Leshin, 125 USPQ 416) in order to provide a stable, intimate contact with the copper layer.

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11. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saint-Cyr '589 in view of Neumann et al. '736 in view of Basol '569 as applied to claim 6 above, and further in view of Spaeth 5,812,570. Saint-Cyr in view of Neumann in view of Basol does not disclose the hard solder being a gold-tin solder. However, Spaeth discloses (see, for example, column 4, line 4) an adhesive made of AuSn alloy (gold-tin solder). It would have been obvious to one of ordinary skill in the art at the time of invention to have the hard solder being a gold-tin solder because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice (In re Leshin, 125 USPQ 416) in order to adhere two structures in a semiconductor device together.

INFORMATION ON HOW TO CONTACT THE USPTO

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 571-272-1733. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eugene Lee
March 16, 2005

A handwritten signature in black ink, appearing to be 'Eugene Lee', with a stylized, flowing script.